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UNSOLICITED PROPOSAL FOR
IMAGE ANALYSIS (U)

TO-B 21-68

GROUP-1
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21 December 1967

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Reg. # 16682

PROPOSAL FOR CONTINUATION OF IMAGE ANALYSIS (U)

INTRODUCTION

[redacted] are pleased to submit this unsolicited proposal for the continuation of [redacted] Task Order 22, The technical details are not included in this proposal since they are contained in the Second Quarterly and the Interim Reports on the present contract. Therefore, only a Work Statement and Cost Proposal are included in this document. For further discussions concerning the items in the Work Statement, the reader is referred to the above mentioned reports.

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WORK STATEMENT

[redacted] will provide the necessary services and personnel to perform the following work: 25X1

PHASE I — COHERENCE MEASUREMENTS

A. Spatial Coherence

1. Finish measurements of spatial coherence of an optical system by using prism method.
   a. Observe fringe pattern directly.
2. Use the cone method to measure spatial coherence.
   a. Investigate feasibility of such a measurement
   b. Determine if two-dimensional measurement of spatial coherence is useful in real world measurements of instruments.
3. Compare items 1 and 2 as practical methods of measuring coherence of instruments.

B. Investigation of Shaded Apertures as Filters in Conventional Imaging Systems

1. Determine and demonstrate a class of problems in which incoherent filtering is useful.
2. Determine the practicality of using shaded apertures in instruments viewing grain limited imagery assuming a knowledge of the degree of coherence in the object plane.
   a. Microscope
   b. Viewers
   c. Enlargers.

PHASE II — CHEMISTRY

A. Perform Support Investigations as Specified by N.P.I.C.

1. Support electron microscopy investigations
2. Support N.P.I.C. in-house image quality investigations.

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PHASE III — IDT SHADED APERTURE INVESTIGATION

A. Construction of an Optimum Least Squares Filter

1. Determine the power spectrums $\phi_{SS}(\omega)$ and $\phi_{NN}(\omega)$ of the signal and noise respectively and the cross power spectrum $\phi_{SN}(\omega)$ of the signal and noise.
   a. Conduct experimental study
   b. From these results find the optimum filter.
2. Determine the cross power spectrum of a signal and the image of the signal $\phi_{S(S+N)}(\omega)$ and the power spectrum of the image of a signal $\phi_{(S+N)(S+N)}(\omega)$.
   a. Conduct experimental study
   b. From these results find the optimum filter.
3. Compare items 1 and 2 to see if they are the same. Then decide which is the easiest way to fabricate Weiner filters for use in scanning instruments such as the IDT.
4. Determine which classes of objects and for which types of exploitation tasks (other than the IDT) the Weiner filter is most useful.

B. Two-Dimensional Brightness Distribution from Objects Imaged Near Resolution Limit of Recording System

1. Consider distortions due to brightness distribution when two or more objects of this size are imaged close together.

C. IDT Traces

1. Make carefully controlled IDT traces of aerial photography having ground truth.
   a. Analyze and interpret such traces
   b. Determine accuracy of sizing objects near the resolution limit for such measurements
   c. Determine extent to which IDT traces of shadows are useful in sizing or identifying objects near resolution limit.

2. Use item A and this year's results to improve ability to interpret IDT traces of low-contrast imagery.

D. IQ and High Magnification Viewer-Printer

1. Compare IDT and IQ quantitatively.